



Science Standards of Learning *Sample Scope & Sequence*

Grade 5

*Commonwealth of Virginia
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P.O. Box 2120

Richmond, Virginia 23218-2120

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Superintendent of Public Instruction

Jo Lynne DeMary

Deputy Superintendent for Instruction

Patricia I. Wright

Assistant Superintendent for Instruction

Linda M. Wallinger

Office of Elementary Instructional Services

Linda Poorbaugh, Director

Paula J. Klonowski, Science Specialist

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Preface

As an additional resource to help school divisions develop curricula aligned to the 2003 Standards of Learning, the Virginia Department of Education has developed sample scope and sequence documents for kindergarten through grade eight and for core high school courses. These sample documents provide guidance on how the essential knowledge, skills, and processes that are identified in the Standards of Learning and the Standards of Learning Curriculum Frameworks may be introduced to students in a logical, sequential, and meaningful manner.

These sample scope and sequence documents are intended to serve as general guides to help teachers and curriculum developers align their curricula and instruction to support the Standards of Learning. Each sample document is organized around specific topics to help teachers present information in an organized, articulated manner. Also included are correlations to the Standards of Learning for that curricular area for a particular grade level or course, as well as ideas for classroom assessments and teaching resources.

The sample scope and sequence documents are not intended to prescribe how curriculum should be developed or how instruction should be delivered. Instead, they provide examples showing how teachers and school divisions might present to students in a logical and effective manner information that has been aligned with the Standards of Learning. School divisions that need assistance in developing curricula aligned with the Standards of Learning are encouraged to consider the sample scope and sequence guides. Teachers who use the documents should correlate the content identified in the guides with available instructional resources and develop lesson plans to support instruction.

The *Science Standards of Learning Sample Scope and Sequence* and the *Science Standards of Learning Curriculum Framework* can be found in both PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at <http://www.doe.virginia.gov/VDOE/Instruction/sol.html>.

Introduction

The following sample scope and sequence is based on the essential content, skills, and processes developed for each Fifth Grade standard in the *Science Standards of Learning Curriculum Framework*. It is not intended to be a complete or exhaustive set of all that students should master at this level, but instead the scope and sequence organizes a core of key skills, content, and processes around basic topic areas.

The topic areas generally correspond to individual standards; however, certain standards are reorganized and grouped with components of other standards to comprise meaningful instructional clusters. The various topics are not intended to require equal instructional time. Additional objectives have not been developed, and no attempt has been made to transition or further explain the content. Additional information may be obtained from the overview and introductory sections of the Fifth Grade *Science Standards of Learning Curriculum Framework* (<http://www.doe.virginia.gov/VDOE/Instruction/Science/sciCF.html>).

An important and consistent thread among these organizational topics is the application of inquiry skills throughout. Students should have an opportunity to master the various science concepts in each topic area in the context of active learning and inquiry processes. The focus on inquiry is further reinforced by having the first topic in the scope and sequence as a discrete treatment of the science skills; however, a discrete treatment is certainly not required. This represents only one way to organize instruction; there are many other valid and useful organizational schemes.

Effective science teaching requires assessing and understanding what students know and need to learn and then challenging and supporting them to learn it well. The array of effective assessment techniques that teachers can employ in the classroom goes well beyond traditional assessments, and science instruction lends itself well to alternative approaches such as portfolios, student self assessments, and short videotaped presentations. The assessments mentioned in the scope and sequence are intended to be general. It is the role of the local curriculum to develop a detailed review of what is most effective for the particular concept being developed.

The resources section included in this scope and sequence provides a brief sample of instructional resources and staff development materials that are generally available without charge. There is a significant body of commercially available instructional materials that correlates well with the Science Standards of Learning and is of very high quality. This document, however, does not include references to those materials.

Organizing Topic	Related Standards
Investigation Skills	5.1
Investigating the Structure and States of Matter	5.4, 5.1
Investigating Cells	5.5 a, 5.1
Investigating the Characteristics of Organisms	5.5 b, c, d, 5.1
Investigating the Ocean Environment	5.6, 5.1
Investigating the Changing Earth	5.7, 5.1
Investigating Sound	5.2, 5.1
Investigating Light	5.3, 5.1

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigation Skills (A discrete introduction to specific science skills is not necessary, as all of the inquiry skills should be incorporated within the following topical areas. Teachers may consider introducing some of these skills in isolation or coordinated with mathematics, English, and history instruction.)	Students should be able to:	5.1	Student demonstrations Classroom observations Student work Quizzes Tests	<i>Teaching and Learning the Basic Science Skills</i> videotape teacher training series, site guide: http://www.doe.virginia.gov/VDOE/Instruction/sol.html SOL assessment blueprints and sample items <i>Science SOL Curriculum Framework:</i> http://www.doe.virginia.gov/VDOE/Instruction/Science/sciCF.html <i>DOE Lessons from the Bay</i> teaching module http://www.doe.virginia.gov/VDOE/LFB/
	use classification keys to identify rocks, minerals, and organisms. make plausible estimations of length, mass, and volume. select and use the appropriate instruments, including centimeter rulers, meter sticks, graduated cylinders, balances, and stopwatches, for making basic measurements. measure temperature, length, mass, and volume, using metric measures. This includes millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius. collect, record, and report data, using charts and tables, and translate numerical data into bar or line graphs. make predictions based on trends in data. This requires the recognition of patterns and trends and determination of what those trends may represent. analyze the variables in a simple experiment and identify the manipulated (independent) and responding (dependent) variables.			

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigation Skills (continued)	define/make observations and inferences. distinguish between observations and inferences. measure, record, identify, collect, and organize observations. Distinguish between qualitative and quantitative observations.			

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Structure and States of Matter	<p>Students should be able to:</p> <p>construct and interpret models of atoms, elements, molecules, and compounds.</p> <p>design an investigation to determine how heat affects the states of matter (e.g., water). Include in the design ways information will be recorded, what measures will be made, what instruments will be used, and ways the data will be graphed.</p> <p>construct and interpret a sequence of models (diagrams) showing the activity of molecules in all three states of matter.</p> <p>compare and contrast mixtures and solutions, elements and compounds, and atoms and molecules.</p>	5.4	<p>Student demonstrations</p> <p>Classroom observations</p> <p>Student work</p> <p>Quizzes</p> <p>Tests</p>	<p>DOE <i>Lessons from the Bay</i> teaching module http://www.doe.virginia.gov/VDOE/LFB/</p> <p><i>Physical Science SOLutions</i> module: http://www.smv.org/pubs/index.html</p>
	<p>apply the 5.1 science skills in the context of the content of this topic.</p>	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating Cells	Students should be able to:	5.5 a	Student demonstrations Classroom observations Student work Quizzes Tests	
	draw, label, and describe the essential structures and functions of plant and animal cells. For plants, include the nucleus, cell wall, cell membrane, vacuole, chloroplasts, and cytoplasm. For animals, include the nucleus, cell membrane, vacuole, and cytoplasm. design an investigation to make observations of cells. compare and contrast plant and animal cells and identify their major parts and functions.			
	apply the 5.1 science skills in the context of the content of this topic.	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Characteristic of Organisms	Students should be able to:			
	compare and contrast the distinguishing characteristics of the kingdoms of organisms.	5.5 b	Student demonstrations Classroom observations	DOE <i>Lessons from the Bay</i> teaching module http://www.doe.virginia.gov/VDOE/LFB/
	group organisms into categories, using their characteristics: living things (kingdoms), plants (vascular and nonvascular), and animals (vertebrates or invertebrates). Name and describe two common examples of each group.	5.5 b,c,d	Student work Quizzes Tests	
	apply the 5.1 science skills in the context of the content of this topic.	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Ocean Environment	Students should be able to:	5.6	<p>Student demonstrations</p> <p>Classroom observations</p> <p>Student work</p> <p>Quizzes</p> <p>Tests</p>	<p>DOE <i>Lessons from the Bay</i> teaching module http://www.doe.virginia.gov/VDOE/LFB/</p> <p>Ocean Sciences Education Teacher Resource Center: http://www.vims.edu/bridge</p> <p>Chesapeake Bay Program: http://www.chesapeakebay.net/</p>
	<p>explain key terminology related to the ocean environment.</p> <p>create and interpret a model of the ocean floor and label and describe each of the major features.</p> <p>research and describe the variation in depths associated with ocean features, including the continental shelf, slope, rise, the abyssal plain, and ocean trenches.</p> <p>design an investigation (including models and simulations) related to physical characteristics of the ocean environment (depth, salinity, formation of waves, and currents, such as the Gulf Stream).</p> <p>interpret graphical data related to physical characteristics of the ocean.</p> <p>explain the formation of ocean currents and describe and locate the Gulf Stream.</p> <p>design an investigation (including models and simulations) related to biologic characteristics of the ocean environment (ecological relationships).</p>			

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Ocean Environment (continued)	<p>interpret graphical data related to the biological characteristics of the ocean, such as the number of organisms vs. the depth of the water.</p> <p>analyze how the physical characteristics (depth, salinity, and temperature) of the ocean affect where marine organism can live.</p> <p>create and interpret a model of a basic marine food web, including floating organisms (plankton), swimming organisms, and organisms living on the ocean bottom.</p>	5.6		
	<p>apply the 5.1 science skills in the context of the content of this topic.</p>	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Changing Earth	Students should be able to:	5.7	<p>Student demonstrations</p> <p>Classroom observations</p> <p>Student work</p> <p>Quizzes</p> <p>Tests</p>	<p>DOE <i>Lessons from the Bay</i> teaching module http://www.doe.virginia.gov/VDOE/LFB/</p> <p>Luck Stone <i>Rock</i> interactive multimedia kit</p> <p>USGS Learning Web: http://interactive2.usgs.gov/learningweb/teachers/lesson_plans.htm</p> <p>Virginia Earth Science Resource Page: http://vtso.geol.vt.edu/vesr/vesrplates.html</p>
	<p>apply basic terminology (italic print in overview) to explain how the Earth surface is constantly changing.</p> <p>draw and label the rock cycle and describe the major processes and rock types involved.</p> <p>compare and contrast the origin of igneous, sedimentary, and metamorphic rocks.</p> <p>identify rock samples (granite, gneiss, slate, limestone, shale, sandstone, and coal), using a rock classification key.</p> <p>make plausible inferences about changes in the Earth over time based on fossil evidence. This includes the presence of fossils of organisms in sedimentary rocks of Virginia found in the Appalachians, Piedmont, and Coastal Plain/Tidewater.</p> <p>describe the structure of Earth in terms of its major layers—crust, mantle, and inner and outer cores—and how the Earth’s interior affects the surface.</p> <p>differentiate among the three types of plate tectonic boundaries (divergent, convergent, and sliding) and how these relate to the changing surface of the Earth and the ocean floor (5.6).</p>			

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating the Changing Earth (continued)	<p>compare and contrast the origin of earthquakes and volcanoes and how they affect the Earth's surface.</p> <p>design an investigation to locate, chart, and report weathering and erosion at home and on the school grounds. Create a plan to solve erosion problems that may be found.</p> <p>differentiate between weathering and erosion.</p> <p>design an investigation to determine the amount and kinds of weathered rock material found in soil.</p> <p>describe how people change the Earth's surface and how negative changes can be controlled.</p>	5.7		
	<p>apply the 5.1 science skills in the context of the content of this topic.</p>	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating Sound	Students should be able to:	5.2	<p>Student demonstrations</p> <p>Classroom observations</p> <p>Student work</p> <p>Quizzes</p> <p>Tests</p>	<p><i>Physical Science SOLutions</i> module: http://www.smv.org/pubs/index.html</p>
	<p>use the basic terminology of sound to describe what sound is, how it is formed, how it affects matter, and how it travels.</p> <p>create and interpret a model or diagram of a compression wave.</p> <p>explain why sound waves travel only where there is matter to transmit them.</p> <p>explain the relationship between frequency and pitch.</p> <p>design an investigation to determine what factors affect the pitch of a vibrating object. This includes vibrating strings, rubber bands, beakers/bottles of air and water, tubes (as in wind chimes), and other common materials.</p> <p>compare and contrast sound traveling through a solid with sound traveling through the air. Explain how different media (solid, liquid, and gas) will affect the transmission of sound.</p>			

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating Sound (continued)	compare and contrast the sounds (voice) that humans make and hear to that of other animals. This includes bats, dogs, and whales.	5.2		
	compare and contrast how different kinds of musical instruments make sound. This includes string instruments, woodwinds, percussion instruments, and brass instruments.			
	apply the 5.1 science skills in the context of the content of this topic.	5.1		

Organizing Topic	Essential Knowledge, Skills, and Processes	Related SOL	Sample Classroom Assessment Methods	Sample Resources
Investigating Light	Students should be able to: explain the relationships between wavelength and the color of light. Name the colors of the visible spectrum. diagram and label a representation of a light wave, including wavelength, peak, and trough. compare and contrast reflection and refraction, using water, prisms, and mirrors. explain the terms <i>transparent</i> , <i>translucent</i> , and <i>opaque</i> , and give an example of each. analyze the effects of a prism on white light and describe why this occurs. Explain why a rainbow occurs.	5.3	Student demonstrations Classroom observations Student work Quizzes Tests	<i>Physical Science SOLutions</i> module: http://www.smv.org/pubs/index.html
	apply the 5.1 science skills in the context of the content of this topic.	5.1		